

CLAIMS

What is claimed is:

1. A method of wideband communication between a base station and a plurality of remote terminals within each cell of a multi-cell network, comprising:

1) at each base station, processing a base input data signal for broadcast to remote terminals in the same cell by:

demultiplexing the base input data signal into a plurality of base channels;

modulating a portion of the base input data signal in each base channel;

time division multiplexing each modulated base channel within one or more data time periods to form a base output data signal;

spreading the base output data signal with a pseudo-random noise signal to form a broadcast signal;

broadcasting the broadcast signal to be received by the plurality of remote terminals within the same cell; and,

2) at each remote terminal, processing a terminal data signal for transmission to the base station in the same cell by:

demultiplexing the terminal data signal into one or more terminal channels;

modulating a portion of the terminal input data signal in each terminal channel;

spreading each modulated terminal channel with an orthogonal code to form an orthogonal signal;

summing a predetermined number of the orthogonal signals to form a terminal signal; and

scheduling the terminal signal for transmission by the remote terminal to be received by the base station in the same cell synchronously with terminal signals from other remote terminals in the same cell.

2. The method of claim 1, further comprising:

transmitting the terminal signal from each remote terminal to be received by the base station in the same cell synchronously with terminal signals from other remote terminals in the same cell.

3. The method of claim 2, wherein all orthogonal codes used to spread modulated terminal channels have zero cross-correlation with one another.

4. The method of claim 2, wherein all orthogonal codes used to spread modulated terminal channels have sufficiently low cross-correlation with one another to reject interfering signals from remote terminals in other cells.

5. The method of claim 4, wherein the orthogonal codes are selected pseudo-randomly for spreading the modulated terminal channels.

6. The method of claim 1, wherein summing a predetermined number of the orthogonal signals to form a terminal signal further comprises:

determining the predetermined number of orthogonal signals based upon the terminal data signal.

7. The method of claim 2, wherein broadcasting the broadcast signal and transmitting the terminal signal from each remote terminal further comprise:

broadcasting the broadcast signal from a base in a cell and transmitting the terminal signal from each remote terminal in the same cell on the same carrier frequency in a time division duplex scheme.

8. The method of claim 1, wherein time division multiplexing each modulated base channel within one or more data time periods to form a base output data signal further comprises:

time division multiplexing a predetermined number of the modulated base channels within each time period to form a plurality of data time periods.

9. The method of claim 8, wherein spreading the base output data signal with a pseudo-random noise signal to form a broadcast signal further comprises:

spreading each data time period with a pseudo-random noise signal to form PN-spread data time periods; and

scheduling the PN-spread data time periods for broadcasting in a time division multiple access scheme.

10. A wideband communication system for communicating between a base station and a plurality of remote terminals within each cell of a multi-cell network, comprising:

1) at each base station, logic for processing a base input data signal for broadcast to remote terminals in the same cell comprising:

a base demultiplexer for demultiplexing the base input data signal into a plurality of base channels;

a plurality of base modulators for modulating a portion of the base input data signal in each base channel;

a base multiplexer for time division multiplexing each modulated base channel within one or more data time periods to form a base output data signal;

a base multiplier for spreading the base output data signal with a pseudo-random noise signal to form a broadcast signal;

a RF system for broadcasting the broadcast signal to be received by the plurality of remote terminals within the same cell; and,

2) at each remote terminal, logic for processing a terminal data signal for transmission to the base station in the same cell comprising:

a terminal demultiplexer for demultiplexing the terminal data signal into one or more terminal channels;

a terminal modulator in each terminal channel for modulating a portion of the terminal input data signal in each respective terminal channel;

a terminal multiplier for spreading each modulated terminal channel with an orthogonal code to form an orthogonal signal;

a terminal adder for summing a predetermined number of the orthogonal signals to form a terminal signal; and

logic for scheduling the terminal signal for transmission by the remote terminal to be received by the base station in the same cell synchronously with terminal signals from other remote terminals in the same cell.

11. The system of claim 10, further comprising:

a transmitter at each remote terminal for transmitting the terminal signal from the respective remote terminal to be

received by the base station in the same cell synchronously with terminal signals from other remote terminals in the same cell.

12. The system of claim 10, wherein the terminal multiplier for spreading each modulated terminal channel with an orthogonal code to form an orthogonal signal comprises:

a terminal multiplier using orthogonal codes having zero cross-correlation with one another to spread the modulated terminal channels to form an orthogonal signal.

13. The system of claim 10, wherein the terminal multiplier for spreading each modulated terminal channel with an orthogonal code to form an orthogonal signal comprises:

a terminal multiplier using orthogonal codes having sufficiently low cross-correlation with one another to reject interfering signals from remote terminals in other cells.

14. The system of claim 13, wherein the terminal multiplier comprises:

a terminal multiplier to pseudo-randomly select the orthogonal codes for spreading the modulated terminal channels.

15. The system of claim 10, wherein the terminal adder for summing a predetermined number of the orthogonal signals to form a terminal signal comprises:

a terminal adder for determining the predetermined number of orthogonal signals based upon the terminal data signal.

16. The system of claim 11, further comprising:

a time division duplex system at each base station in a cell for broadcasting the broadcast signal on a preselected carrier frequency; and

a time division duplex system at each remote terminal in the same cell for transmitting the terminal signal from each remote terminal in the respective cell on the preselected carrier frequency used by the base station in the respective cell.

17. The system of claim 10, wherein the base multiplexer for time division multiplexing each modulated base channel within one or more data time periods to form a base output data signal further comprises:

a base multiplexer for time division multiplexing a predetermined number of the modulated base channels within each time period to form a plurality of data time periods.

18. The system of claim 17, wherein the base multiplier for spreading the base output data signal with a pseudo-random noise signal to form a broadcast signal comprises:

a base multiplier for spreading each data time period with a pseudo-random noise signal to form PN-spread data time periods; and the base station further comprises:

a time division multiple access circuit for scheduling the PN-spread data time periods for broadcasting.